

in India for submucous fibrosis and (b) following patients with submucous fibrosis over longer periods of time. Such projects have been undertaken.

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## Frequency of Oral Submucous Fibrosis among 100 South Indians with Oral Cancer

by J. J. PINDBORG, D.D.S., Dr. Odont., *Professor of Oral Pathology, Royal Dental College, Copenhagen, Denmark*, and J. ZACHARIAH, D.D.S., M.D.S., *Department of Oral Pathology, Dental College and Cancer Institute, Medical College, Trivandrum, India*

Submucous fibrosis is an oral condition described first by Joshi<sup>a</sup> and reported mainly among Indians. Reviews of the available literature have recently been published.<sup>b, c</sup> The condition is chronic and is clinically characterized by blanching of the oral mucosa, associated with stiffness of the mucosa. In some cases vesicle formation also occurs. In severe cases the patients have marked difficulties in chewing, swallowing and speaking. Most of the affected patients exhibit a pronounced atrophy of the tongue papillae.<sup>c</sup>

Paymaster,<sup>d</sup> reporting from Bombay, described the development of a slow-growing squamous cell carcinoma in one-third of his patients with submucous fibrosis; Sirsat & Khanolkar,<sup>b</sup> on the other hand, also working among Bombay patients, could not support Paymaster's findings.

During a stay in Trivandrum, South India, the senior author noticed a seemingly high frequency of submucous fibrosis among the population. Moreover, an inquiry of the Cancer Institute in Trivandrum revealed that, in 1963, cancer of the oral cavity constituted 36.6% of all cancers (2311 cases) admitted to the Institute. It seemed of interest, therefore, to determine the frequency of submucous fibrosis among patients with oral cancer, especially as such a study does not appear to have been undertaken previously.

### Materials and methods

During May-July 1964 all patients admitted to the Cancer Institute, Trivandrum, with oral cancer were examined for submucous fibrosis. The study group comprises the first 100 patients admitted to the Institute with verifiable oral carcinoma during the 3-month period. All carcinomas were verified by biopsy.

For comparison, 2000 persons consecutively coming to the Admission Clinic of the Dental College, Trivandrum, during the same period were routinely examined for the presence of submucous fibrosis. These persons came to the Dental College for various oral complaints, but in no case for mucosal lesions only or for oral carcinoma. Each person was examined in electric light and the oral cavity screened by means of two mouth mirrors. Information regarding age, sex, religion and chewing and smoking habits—and, for the cancer patients, chilli intake and clinical symptoms—were entered on special cards.

The diagnosis of submucous fibrosis was made if the patient exhibited clinically a blanched oral mucosa with fibrous bands traversing the cheeks, lips and/or soft palate (Pindborg et al.<sup>c</sup>).

The location of cancer was registered according to the suggestions put forward in the report of an informal international meeting of investigators on the epidemiology and pathology of oropharyngeal tumours that was convened by WHO in New Delhi, 8-15 October 1963.

### Findings

Forty of the 100 oral cancer patients had clinical signs of submucous fibrosis, while only 19 cases

<sup>a</sup> Joshi, S. G. (1953) *Indian J. Otolaryng.*, 4, No. 3, pp. 1-4.

<sup>b</sup> Sirsat, S. M. & Khanolkar, V. R. (1962) *Indian J. med. Sci.*, 16, 189-197.

<sup>c</sup> Pindborg, J. J., Chawla, T. N., Srivastava, A. N., Gupta, D. & Mehrotra, M. L. (1964) *Acta odont. scand.*, 22, 679.

<sup>d</sup> Paymaster, J. C. (1956) *Cancer (Philad.)*, 9, 431-435.

TABLE 1  
DISTRIBUTION OF 100 ORAL CANCER PATIENTS ACCORDING TO SEX,  
AGE AND PRESENCE OF SUBMUCOUS FIBROSIS

Patients	Sex	Age-group (years)						Total
		20-29	30-39	40-49	50-59	60-69	70-79	
With submucous fibrosis	Male	2		5	10	11		28
	Female		1		10	1		12
Without submucous fibrosis	Male		7	11	13	10	8	49
	Female		2	2	3	3	1	11
Total		2	10	18	36	25	9	100

were found among the 2000 non-cancerous persons examined.

Table 1 gives the distribution of the cancer-patient group by age, sex and diagnosis of submucous fibrosis. Seventy-seven of the patients were males. The male:female ratio among patients with submucous fibrosis was 2.3:1, and among those without was 4.5:1.

The various symptoms experienced by the patients are tabulated in Table 2. Pain, swelling, ulceration and sensitiveness to spicy food were the more common symptoms in both groups of patients. Patients

TABLE 2  
SYMPTOMS EXPERIENCED BY ORAL CANCER PATIENTS,  
WITH AND WITHOUT SUBMUCOUS FIBROSIS

Symptoms	Number of patients	
	with submucous fibrosis	without submucous fibrosis
Pain	4	16
Referred pain		3
Swelling (nodule)	10	13
Whitish patch	5	5
Ulceration	16	23
Numbness	1	1
Toothache and loosening of teeth in affected area	3	4
Burning sensation to spicy food	23	12
Difficulties in swallowing	6	8
Trismus	9	4
Increased salivation	1	

with submucous fibrosis seem to be more sensitive to spicy food and to experience less pain than patients without submucous fibrosis in the material studied.

The location of the cancer in the 100 patients is given in Table 3. The number of carcinoma sites exceeds the number of patients as all anatomical areas affected by the cancer were noted and many tumours extended into two or more areas. In many cases it was impossible to establish the anatomical origin of the tumour. One patient (with submucous fibrosis) had cancer in three independent areas. Table 3 shows a very large preponderance of oral cancer in the lower, as opposed to the upper, oral cavity: 77% of the tumours found in the buccal groove, gingiva, alveolar ridge, palate and floor of the mouth were located in the lower area. Among the 100 patients with oral cancer, the tumour was located on the left side in 59, on the right side in 38 and in the mid-line in three patients.

The location of the submucous fibrosis in the 40 patients affected is shown in Table 4. The cheeks were always affected. Next in frequency was the tongue, where the changes consisted of a marked atrophy of the tongue papillae. More rarely affected were the gingiva and floor of the mouth. In three patients the palate was the seat of an unusual, extensive, dark pigmentation of the type described by Paymaster.<sup>d</sup>

Ninety-eight of the 100 patients either chewed tobacco and/or smoked *bidis*<sup>e</sup> (see Table 5). The

<sup>e</sup> A *bidi* is an Indian form of cheap cigarette. It is made by rolling between the fingers a rectangular dried piece of *Temburni* (*Diospyros melanoxylon*), also called *Tendu* leaf, with 0.30-0.36 g of Saurashtra tobacco (from the State of Gujarat) or Nipani tobacco (from the State of Mysore) and securing the roll with thread. The size of a *bidi* varies from 4 cm to 7.5 cm.

TABLE 3  
LOCATION AND NUMBER OF LESIONS IN 100 ORAL  
CANCER PATIENTS

Location of lesion <sup>a</sup>	Number of lesions
Lips, vermillion border only	
Upper	2
Lower	2
Labial mucosa	
Upper	4
Lower	4
Buccal mucosa	
Commissural area up to 1 cm <sup>2</sup> posterior to commissure	12
Cheek proper	61
Retromolar area	31
Buccal groove	
Upper	16
Lower	47
Gingiva	
Upper	4
Lower	19
Alveolar ridge	
Upper	5
Lower	19
Palate	
Hard	1
Soft	1
Floor of mouth	5
Tongue	
Dorsal surface	4
Borders and tip	12
Ventral surface	0
Anterior faucial pillar	12

<sup>a</sup> Classification proposed in the report of an informal international meeting of investigators on the epidemiology and pathology of oropharyngeal tumours convened by WHO in New Delhi, 8-15 October 1963.

tobacco was chewed either alone, with lime, or wrapped in betel leaves and mixed with betel nuts (a so-called "pan"). No striking difference was observed in the smoking habits of patients with and of those without submucous fibrosis.

TABLE 4  
LOCATION OF SUBMUCOUS FIBROSIS LESIONS  
IN 40 ORAL CANCER PATIENTS

Location of lesions	Number of patients
Labia mucosa	
Upper	19
Lower	29
Buccal mucosa (cheek)	40
Gingiva	1
Soft palate	14
Floor of mouth	6
Tongue	32
Anterior faucial pillar	25

### Discussion

The finding of submucous fibrosis in 40 out of 100 oral cancer patients and in less than 1% of a non-cancerous group simultaneously examined might suggest a predisposition for cancer among submucous fibrosis patients. Similar results were also observed in North India,<sup>f</sup> where large groups attending the admission clinics of two dental colleges, one in Lucknow and the other in Bombay, were examined for submucous fibrosis. Of the total of 20 000 persons examined, 0.5% were found to have submucous fibrosis; among the persons with submucous fibrosis 6% were found to be suffering from oral cancer, whereas among those without submucous fibrosis only 0.14% were found to have oral cancer.

The etiology of submucous fibrosis is still unknown. The most likely explanation seems to be that chilli is an irritant—a hypothesis proposed by Sirsat & Khanolkar,<sup>g</sup> who also demonstrated experimentally that the painting of rat palates with capsaicin, the active ingredient of chilli, causes a connective tissue response similar to the changes observed in humans with submucous fibrosis.

The mechanism involved in the development of oral cancer in patients with submucous fibrosis is also not yet understood. A recent analysis of 33 oral biopsies from patients with submucous fibrosis showed that the epithelium was atrophic in 31.<sup>h</sup>

<sup>f</sup> See note by J. J. Pindborg on page 748 of this issue.

<sup>g</sup> Pindborg, J. J., Chawla, T. N., Srivastava, A. N. & Gupta, D. (1965) *Acta odont. scand.*, 23 (in press).

TABLE 5  
CHEWING AND SMOKING HABITS AMONG 100 ORAL CANCER PATIENTS

Patients	Tobacco-chewing	<i>Bidi</i> -smoking	Tobacco-chewing and <i>bidi</i> -smoking	No chewing or smoking habits	Total
With submucous fibrosis	24	1	15	0	40
Without submucous fibrosis	28	1	29	2	60
Total	52	2	44	2	100

It is generally accepted that atrophic epithelium is more likely to undergo malignant change than epithelium of a normal thickness, and, accordingly, patients with submucous fibrosis may thus be predisposed to develop oral cancer under the influence of carcinogens. It would in this connexion have been of interest to correlate the location of the cancerous and submucous fibrosis lesions in the 40 patients affected, but such a study was impossible in the present material because the size and extent of the tumours made it impossible to determine whether there had been submucous fibrosis at the original cancer site. The present material therefore contains only a tabulation of the observed sites of the two conditions separately, and it cannot be excluded in this connexion that the study material of 100 cancer patients contained more than 40 with submucous fibrosis if the only site of the fibrosis was obliterated by a growing cancer. This point will be investigated in a later study, where persons with submucous fibrosis will be examined at regular intervals for developing oral malignancy at the site of the fibrosis. Meanwhile we have applied a biopsy method for the closer study of the histological changes at the tumour site and their possible relation to submucous fibrosis whereby a small slice of mucosa is removed perpendicular to the edge of the tumour, containing cancer tissue, marginal tissue, and adjacent tis-

sue. Results with this method will be reported shortly.

In view of the results of this preliminary study, a large controlled study has been started in Trivandrum to investigate further the supposed precancerous nature of submucous fibrosis. Persons with and without an initial diagnosis of submucous fibrosis will be followed up at regular intervals for developing malignancies. It is our intention to note particularly the development of leukoplakia in both groups and to observe the sequence and clinical nature of the development of submucous fibrosis, leukoplakia and carcinoma in the patient group. It is possible that submucous fibrosis develops first into leukoplakia and then into cancer in the presence of carcinogens. It should be possible to investigate this and other hypotheses by examining the study population at appropriately short intervals.

Meanwhile it would be of interest to continue to map out the frequency of submucous fibrosis in various parts of India and study its relation to chilli intake, tobacco-chewing and *bidi*-smoking, religion, age and sex, in order to obtain further information on the etiology of the condition.

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## Transliteration from Cyrillic characters

The "International System for the Transliteration of Cyrillic Characters", set out in Recommendation ISO/R9-1954 (E) of the International Organization for Standardization, is normally used in the *Bulletin of the World Health Organization* for personal names, titles of publications, etc. However, papers accepted for publication may contain names transliterated differently, and if the original Cyrillic spelling is not recognizable inconsistencies may occur.

For convenience the transliteration from Russian according to ISO/R9 is given below:

## Translittération des Caractères cyrilliques

Le «Système international pour la translittération des caractères cyrilliques» présenté dans la Recommandation ISO/R9-1954 (F) de l'Organisation internationale de Normalisation est généralement utilisé dans le *Bulletin de l'Organisation mondiale de la Santé* pour les noms de personnes, les titres de publications, etc. Cependant des articles acceptés pour publication peuvent contenir des noms translittérés différemment et si l'orthographe cyrillique originale n'est pas reconnaissable un manque d'uniformité peut s'ensuivre.

A toutes fins utiles, la translittération du russe selon la recommandation ISO/R9 est indiquée ci-après:

Cyrillic character Caractère Cyrillique	Trans- literation from Russian Trans- littération du russe	Examples and remarks Exemples et observations	Cyrillic character Caractère Cyrillique	Trans- literation from Russian Trans- littération du russe	Examples and remarks Exemples et observations
А, а	a	Адрес = Adres	У, у	u	Утро = Utro
Б, б	b	Баба = Baba	Ф, ф	f	Физика = Fizika
В, в	v	Вы = Vy	Х, х	h	Химический = Himičeskij
Г, г	g	Глава = Glava	Ц, ц	c	Центральный = Central'nyj
		Голова = Golova	Ч, ч	č	Часы = Časy
Д, д	d	Да = Da	Ш, ш	š	Школа = Škola
Е, е (ё) <sup>1</sup>	e (ë)	Ещё = Eščë	Щ, щ	šč	Щека = Ščeka
Ж, ж	ž	Журнал = Žurnal	(medial, médial)	"or" "ou"	In modern Russian, where ' sometimes replaces medial ъ, transliteration is still ". En russe moderne, où le ' remplace quelquefois le ъ médial, la translittération reste ".
З, з	z	Звезда = Zvezda			
И, и	i	Или = Ili	(final)	(Not trans- literated. Non trans- littéré.)	
Й, й	j	-ый, -ий, -ой = -yj, -ij, -oj			
К, к	k	Как = Kak			
Л, л	l	Любить = Ljubit'			
М, м	m	Муж = Muž			
Н, н	n	Нижний = Nižnij	Ы, ы	y	
П, п	p	Первый = Pervyj	Ь, ь	'or' 'ou'	Маленький = Malen'kij
Р, р	r	Рыба = Ryba	Э, э	ě	Это = Èto
С, с	s	Сестра = Sestra	Ю, ю	ju	Южный = Južnyj
Т, т	t	Товарищ = Tovarišč	Я, я	ja	Яйцо = Jajco

<sup>1</sup> Cyrillic ё to be transliterated by ë only when the diacritical appears in the original. Le ё cyrillique ne doit être translittéré par ë que lorsque la diacritique apparaît dans l'original.